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INSURING CROP AND LIVESTOCK LOSSES CAUSED BY RESTRICTED PESTICIDE USE: An Appraisal



ABSTRACT

This report examines the feasibility of insuring losses to farmers and ranchers caused by restricted use of crop pesticides and predator poisons. It describes characteristics of such losses and reviews potential problems in establishing an insurance program if the basic principles of insurance are to be followed. Also discussed is the feasibility of utilizing an all-risk insurance program to cover crop and livestock losses that result from pesticide restrictions.

Key Words: Crop insurance, livestock insurance, pesticides.

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SUMMARY

An insurance program to protect farmers and ranchers against economic losses caused solely by restrictions in the use of crop pesticides and predator poisons does not seem feasible now.

Isolating such losses from other losses in crop and livestock production is impossible in most instances. Thus, it would be difficult to establish premium rates and coverages and to measure and verify indemnity payments. Further, administrative problems and costs of operating such an insurance program would probably be prohibitive.

Utilizing an all-risk insurance program to cover crop and livestock losses resulting from pesticide bans would be the most practical type of insurance. Expansion of all-risk insurance to cover such losses would be hampered, however, by a lack of actuarial data, the possibility of heavy losses, and inadequate ways of verifying such losses. In effect, it would not be a true insurance in terms of accepted insurance principles. Also, it might require substantial Government financial support. If the program were self-supporting, it would fail to attract many participants because premium rates would probably be high and the amount of protection would probably be relatively low.

INSURING CROP AND LIVESTOCK LOSSES
CAUSED BY RESTRICTED PESTICIDE USE: AN APPRAISAL^{1/}

by

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INTRODUCTION

On June 14, 1972, the Environmental Protection Agency (EPA) made the announcement that the use of DDT for most agricultural purposes would be prohibited after December 31, 1972. Earlier, on March 10, EPA had ordered an immediate halt to interstate shipment of all poisons registered for use in controlling predatory animals that kill sheep and other domestic livestock.

These actions, which are part of the drive for a better environment throughout the Nation, will have an increasing economic impact on agriculture. Many crop producers will be faced with lower output or higher costs as they switch to less effective or more costly pesticides.^{2/} Ranchers may have increased livestock losses, particularly of sheep, with the prohibition of predator poisons. Measuring the effect on the net incomes of farmers and ranchers will be difficult, however, even after the full extent of the environmental restrictions and regulations is known.

Many questions have arisen concerning the economic effects that pesticide restrictions will have on farmers. One question concerns who should bear the cost of reducing "pollution" currently coming from agriculture. In the short run, individual farmers and ranchers probably must bear the brunt of any such cost. The extent to which society will stand any of the expense through increased prices or taxes is not yet clear.

Some students of the problem have proposed insurance as a means of spreading among producers the economic losses arising from the restriction

1/ This report has benefited from comments by Earl1 Nikkel and David McElwrath of the Federal Crop Insurance Corporation; Jack Birkinsha of the Federal Insurance Administration; and Warren Bailey, Herman Delvo, Theodore Eichers, John Berry, Kenneth Krause, Donald Larson, and Edward Reinsel of the Economic Research Service (ERS).

2/ A 1970 unpublished ERS paper, "Economic Effects of Restricting the Use of DDT on Cotton," reported that 70 percent of farm-used DDT in 1966 was used on cotton. A mixture of toxaphene and methyl parathion will probably be substituted at an estimated cost of \$110 million, double the current cost of using DDT. The report indicated that yield losses without DDT might be 1 to 20 percent, depending on weather and severity of insect populations.

of pesticides.^{3/} It has also been suggested that such insurance would be an incentive for producers to cooperate in curtailing their use of hazardous pesticides.^{4/} This report explores some of the factors necessary for sound insurance and the feasibility of developing an insurance program to deal with economic losses from pesticide restrictions.

THE NATURE OF INSURANCE

Fundamentally, insurance is a way of spreading economic losses of a few individuals over an entire group. Each insured person pays a relatively small premium to protect himself against an infrequent substantial loss. To do this, some risk-handling organization is needed to hold the funds, indemnify those with losses, and perform other functions. A basic function of the insurer is estimating the mathematical probability of loss faced by the group and its important subclasses. The insurer must also identify and measure losses as they occur so as to equitably indemnify those with losses.

The feasibility of an insurance system operating in the traditional sense depends upon certain conditions pertaining to the hazard insured against; the person and property insured; the availability of adequate, pertinent data; and enough participants to spread the losses. Reasonable cost in operating the system is also important.

Insurability of Peril

An important principle of insurance is that the peril causing the loss should be of a random or fortuitous nature. Although there are exceptions, insurance works best against unexpected or infrequent losses that the insured person cannot cause. A hailstorm, for example, is a phenomenon of nature and fulfills the requirement that the peril be random and out of control of the farmer. Insurance also works best to protect against losses that the person has incentives for preventing. If the unexpected becomes the usual or if the person insured can materially affect the outcome, the insurance concept does not work effectively.

Where pesticides and predator poisons are curtailed, substitute control methods are employed at the discretion of the producer. Sheep and crop production under such conditions could be substantially affected by

^{3/} Economists in the Farm Production Economics Division of ERS, for example, have discussed the possibility of such an insurance. The Subcommittee on Fisheries and Wildlife Conservation of the House Committee on Merchant Marine and Fisheries has received a proposal that mentions insurance as one means of dealing with the predator damage problem. A study group on predator control, sponsored jointly by the Council on Environmental Quality and the Interior Department and under the direction of Stanley Cain, included an insurance program in its recommendations. Predator control bill H.R. 13152, arising out of those recommendations, omitted the insurance proposal, however, on the grounds that such a program was not workable at this time. Insurance has also been discussed in hearings before the Senate Appropriations Subcommittee on Agriculture, Environmental and Consumer Protection, chaired by Senator Gale W. McGee.

^{4/} Pesticides are broadly defined in this report to include chemicals used to control crop insects, diseases, and weeds and predator animals.

the attitude and management practices of the producer. In some instances when pesticides and poisons are restricted, reduced output of crops or livestock can be predicted with considerable certainty. To the extent that the loss is known in advance, the situation is not appropriate for insurance.

To guard against situations where the insured can influence the extent of losses, or where he knows that his probable losses will be greater than average, the insurer must go to extra expense to eliminate such adverse risks or to increase premium rates commensurate with the risk. Establishing a proper level of coverage relative to the value of the crop or livestock insured is also an important consideration. If insurance coverage is excessively high, the insured person may tend (by intention or neglect) to contribute to and profit by, a loss if he has any control over it.

Thus, in insuring crop and livestock losses where certain chemicals that affect output are prohibited, it undoubtedly would be necessary to limit protection to less than the full value of the crops and livestock covered. (Federal all-risk crop insurance is limited by law to production costs not to exceed 75 percent of the average value of production.) A limitation in coverage, however, might reduce the number of farmers and ranchers who would buy protection because they might feel their chances of collecting would be much less.^{5/}

Verifying Losses

Another principle of insurance is that the loss from the insured peril must be determinable and measurable. If this is not possible, a problem arises of when and how much to pay the insured. A closely related principle is that the person insured should be indemnified only for actual losses.

The conceptual problem of how to evaluate crops and livestock that are lost during production is a difficult one, but presumably value schedules could be developed that would show rates of indemnification for losses at different stages of production. The administrative problem of the insurance company, however, in actually determining if a loss occurred from a particular cause and then measuring it would be very difficult.^{6/} Determining the specific cause of reduced crop yields or of sheep losses would be particularly difficult in many instances.

It is true that insurers, after many years of experience, have developed techniques of estimating crop losses due to hailstorms. However, hailstorms occur at specific points in time--like fires--and leave damage that is more easily recognizable and measurable than is damage that may develop over the growing season from insects, diseases, and weeds.

^{5/} Another disadvantage of less than full coverage from the standpoint of success of the pesticide reduction program is that if ranchers and farmers themselves must bear part of the losses from pests and predators, there would be continuing incentive to use pesticides and poisons to minimize such losses.

^{6/} Estimates of the cause of crop losses are made by the Federal Crop Insurance Corporation but are less precise where more than one cause--say both drought and insects--contributed to the loss.

Separating and measuring crop losses caused by pesticide restriction from losses that might have occurred under previous pesticide practices would be impossible in most situations.

Verifying that sheep have been killed by predators would be possible for closely attended flocks, but not for flocks unattended or on the open range. Many sheep are lost or die from other causes and whether a predator was involved may not be evident. Even in some instances where a predator has eaten a dead lamb, it may have died earlier from injury, cold, or disease.

Data Needs

To spread losses equitably over all those insured, it is necessary that the mathematical probability of loss be estimated for the universe with some degree of certainty. The insurer will thus know his potential liability and at what level to establish premium rates. Loss probabilities also need to be estimated for different subclasses. For instance, the possibility of crop losses to growers from diseases, weeds, and insects might vary by area, depending on type of crop, soil, and climatic conditions. Similarly, the number of sheep killed by predators would depend on whether the sheep are on the open range or fenced on farms, and whether they are attended. Losses would also vary according to the extent to which crop pesticides and predator poisons are curtailed.

If premium rates in the aggregate are based on an underestimate of potential losses, the insuring organization would soon be in financial difficulty. If rates are not adjusted for subclasses of risk, the sale of insurance would tend to be heavy in areas of above average loss and light where the probability of loss is low. This again would create a financial problem for the insurer and a need for higher premium rates.

Estimating the probability of losses ordinarily requires knowledge of experience over a period of time. For example, information on hail damage to crops has been accumulated over a half century or more. The Federal Crop Insurance Corporation (FCIC) in its all-risk crop insurance has had the benefit of crop yield data by counties as collected by the U.S. Department of Agriculture and others. Since its beginning in 1938, FCIC has also built up a bank of data on crop yields and losses from its own operations. Such data, however, are usually based on generally accepted cultural practices, including the use of pesticides. Historical data on sheep losses have usually been based on situations where poisons have been used to deter predators.

Experience thus has limited value in predicting what economic losses farmers and ranchers might incur from restrictions on pesticides and poisons. Uncertainties are increased by a lack of knowledge as to the kind of chemical restrictions that will evolve and the effectiveness and cost of substitute chemicals and practices that may be developed.

Perhaps the effect on production of withdrawing or curtailing the use of pesticides and predator poisons could be estimated from experimental data and informed opinion. Such estimations, however, would be a tremendous administrative chore in view of the hundreds of separate rate-class areas for which computations would be needed.

In studying these data needs, it should be recognized that losses in crop production result from many causes other than those that pesticides are designed to eliminate, and sheep die from disease, accidents, and causes other than being killed by coyotes and other predators. Usually it is difficult to differentiate these causes of loss. Little or no data are available to permit establishing premium rates on insurance solely to reimburse farmers and ranchers from damage caused by pesticide and poison restrictions.

It is apparent that lack of ready actuarial data would be a major obstacle in setting premium rates and coverages on any basis comparable to other kinds of insurance.

Participation

Because the basic reason for insurance is to spread the losses, or risk, there must be a relatively large number of participants. Certainly many crop producers use pesticides. Also, many sheep ranchers are subject to losses by predator animals. Whether a large number of farmers and ranchers would voluntarily insure against losses caused by pesticide restrictions, however, is not so certain. A mandatory insurance program would achieve the necessary participation but would be generally unpopular and unfair to those feeling no need for the protection.

One objective of the crop and livestock insurance should be for farmers and ranchers to view it as partial compensation for restricting their use of pesticides and poisons. If only a few farmers participate, there probably would be continuing pressure to ease the restrictions on chemicals.

The extent to which such insurance would be used would depend partly on how producers assess the risk and the need for protection. It would also depend on the cost and attractiveness of the insurance that is offered and upon the sales activity of the insurer. With most forms of insurance, individuals frequently feel that they can bear their own losses and have to be "sold" on the protection. The widespread use of the type of crop and livestock insurance discussed here would be deterred by its cost, unless heavily subsidized by the Government. With the Federal crop insurance program, even when the Government pays most of the operating costs, only about 11 percent of the eligible growers participate.

Costs

Any insurance program involves costs that must be borne by those insured, sometimes with the help of the Government. Selling insurance, making actuarial studies, adjusting loss claims, and other functions of the insurer account for these costs. In the private crop-hail insurance industry, costs and profits take more than a third of the premiums paid by the insured. Administrative and operating expenses of the Federal Crop Insurance Corporation--mainly paid by the Federal Government--also amount to about a third of the premiums. Consequently, before starting another insurance program, the benefits of spreading losses among all those insured should be carefully appraised.

Costs of operating an insurance program to protect against economic losses resulting from pesticide restrictions have not been estimated, but it is probable that they would be relatively large. Compared with

other forms of insurance, it would be expensive to establish equitable premium rates and to inspect and verify losses. Despite safeguards that might be taken, the program would tend to attract the higher risk ranchers and farmers, which would result in a disproportionate share of the losses being borne by a relative few. This would be especially true for sheep losses and would discourage many ranchers from buying insurance because the premium cost would be excessive relative to the protection received.

ALL-RISK COVERAGE

An insurance program to cover just the economic losses caused by restricted pesticide use is probably not feasible at this time. The need for actuarial data is too great and separating causes of crop and livestock losses would be difficult, if not impossible, and costly. Thus, only insurance programs that cover all losses should be considered. But even here, problems have long been recognized. All-risk insurance for crop and livestock losses has been available to only a limited extent from private insurance companies. The risk of catastrophic losses, high costs of establishing rates and making inspections, effects that poor managers and adverse risks can have on losses, and the relatively few farmers and ranchers who believe they can afford such insurance, have made it unattractive to insurers.

An all-risk insurance program to cover losses from pesticide curtailment might be more feasible in crop production than in sheep production because of the existing operations and experience of the Federal Crop Insurance Corporation. In fact, FCIC is already facing prospective problems of the DDT ban because it will be selling crop insurance on cotton in areas where use of this pesticide has been prevalent. FCIC experience during 1973 and the next several years will determine the feasibility of covering the additional hazards resulting from the restrictions and also reveal any changes that may be necessary on its insurance terms and conditions.^{7/}

Substitute pesticides on cotton will probably cost more than DDT and their long-run effectiveness has been questioned. Some people are predicting that insects will develop a greater resistance to substitute pesticides than to DDT, with the probability of higher losses. FCIC, in paying indemnities for losses, may require proof that growers followed recommended pesticide practices. It may take several years before FCIC's experience with losses from pesticide restrictions will be adequate to provide information for adjusting premium rates, coverages, and other policy features. In the meantime, FCIC's financial resources might be strained. Further, the cost to FCIC of making actuarial recomputations for different crops and areas will be large. The impact of banning DDT on cotton production will probably not be the same in all areas.

With the likelihood of restrictions becoming more stringent in the

^{7/} Correspondence from FCIC states "...it may be necessary to amend the language of the Act if we anticipate accepting liability where established chemical control practices are prohibited and there are no fully effective substitutes available to the farmer. The Crop Insurance Act states that losses due to 'failure of the insured to follow established good farming practices' shall not be covered."

future and involving additional pesticides and other crops and other sections of the country, the problem of increased losses and operating costs may become more serious to FCIC. The result may be higher premium rates and reduced coverages. This, together with the statutory limit on administrative expenditures, might lead to a reduction in the overall Federal crop insurance program. An alternative would be legislative changes authorizing a greater governmental input for operating costs and a readiness to back up potentially higher losses.8/

From the viewpoint of crop producers, there is question as to whether Federal all-risk crop insurance would be an adequate substitute for the restricted pesticides. Many farmers undoubtedly would object to bearing a fourth or more of the losses as required by the insurance and to paying premiums commensurate with the additional risk. Growers concerned only with production losses resulting from pesticide control may find that the all-risk coverage provides more protection than they want. This may be especially true if the main economic loss is in the form of higher production costs that may not be covered by the insurance.

With respect to sheep and other livestock, an insurance program, even one covering all losses regardless of whether caused by predators, would encounter serious problems. Verifying losses and reducing the number of high-risk producers that would be attracted to such insurance would be important difficulties, as would be the heavy costs of developing actuarial data and administering the program.

8/ FCIC emphasizes that additional subsidy is contrary to present Administration policy.

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